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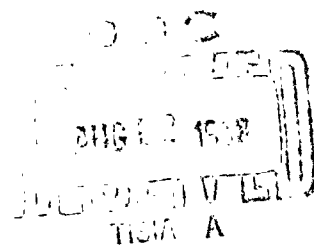
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THE CASE OF A PURE PUBLIC GOOD:
TELEVISION BROADCASTING

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July 1963



P-2773

THE CASE OF A PURE PUBLIC GOOD:
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I. INTRODUCTION

We have learned from Professor Samuelson's recent contributions to theory of public expenditure that the traditional dichotomy of goods into economic and free might be misleading. His tripartite subdivision, blue-chip private, pure public, and impure goods are well known. The impure cases become identified as decreasing cost industries where marginal cost is positive but less than average cost, and the pure public goods are those:

"which all enjoy in common in the sense that individual's consumption of such a good leads to no subtraction from any other individual's consumption of that good..."¹

Others have indicated dissatisfaction with this definition of public good.² It would appear that a brief discussion might profitably indicate some salient points.

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¹Paul A. Samuelson, "The Pure Theory of Public Expenditures," Review of Economics and Statistics, XXXVI (November, 1954), p. 387.

²See Stephen Enke, "More on the Misuse of Mathematics in Economics: A Rejoinder," Review of Economics and Statistics, XXXVII (May, 1955), pp. 131-133, and Julius Margolis, "A Comment on the Pure Theory of Public Expenditure," Review of Economics and Statistics, XXXVII (November, 1955), pp. 347-349.

First, if the proposition were literally true, one would be hard put to distinguish between free and public goods as far as the allocative effect of that good is concerned. Yet, any one service or product can be provided in such a quantity as to make it valueless, in the sense that everyone could have all they wanted without any conflict arising.

Secondly, it is incorrect that -- short of making it a free good as it were -- the consumption of one person does not subtract from what is available for others. It depends on the level and the structure of the "Strategic Air Defense," to use a favorite example, and how it is dispersed. So long as "deterrence" or other similar category of protection is short of certainty, the cost of the failure of such schemes will depend on the nature of the deterrence itself. An important aspect of the nature of deterrence is the geographical dispersion of installations. Have people in Omaha (Strategic Air Command Headquarters), for instance, shown indifference with respect to the installations? And consider the often-heard complaints of our allies with respect to establishment of military bases in their territories, notwithstanding the constant assertions that peace is indivisible? Political or community action has been suggested for providing shelters, which has come to be considered as a deterrence measure, yet we know that shelters in Santa Monica will not protect people in Cambridge.

It might be argued that logically it is possible to think of a good the supply of which is not so large as to make that good free, and yet have the public good definition hold. One need not be against logical possibilities, but we note that Samuelson himself has agreed

that the examples that have been suggested -- Air Defense, etc. -- did not fit the polar case exactly, with the exception of those where the marginal costs are said to be zero. Now the question arises: if we mean by costs the maximum value of the alternative outputs which have been produced by the employment of the resource and are foregone by society, then unless the product of the service happens to be a free good, in what sense can the marginal cost of an activity to society be zero?

The fundamental deficiency of the theory of public good as defined, either regarded as descriptive of the real world or as a classificatory device suggestive of kinds of factors to be looked at in analyzing a particular problem, arises from the fact that such a good costs the society scarce resources. These must be paid for by somebody and somehow, and are usually financed by mandatory collections from the members of the community through fiscal mechanism. Although individual wants may have some relevance within any set of political arrangements, they are fundamental as long as we agree to allow individual preferences to dominate, a concept which underlies the postulated theory. But, it is the inherent character of the solution of the cases which call for political or community action that -- irrespective of the kind of activity, i.e., military, civilian, etc. -- allowance for dissension cannot be made. For example, in defense matters how would we treat religious groups and "pacifists" within the definition?¹ It is one thing to have to behave contrary to the

¹Strictly speaking, the definition does not apply and in fact the name itself is misleading. Even if some of the members were not obliged to contribute, Quakers and the "pacifists," for example, may be willing to pay something in order for others not to indulge in defense -- the more others consume the less satisfied they might be.

wishes of some members of the community, but another thing to provide the service after having required them to participate in the financing, and then call the service provided a public good defined as one that "all enjoy in common," only because the dissenting members, too, may consume without diminishing the consumption of others.

It is not the name -- as it could easily be changed to say majority (?) good -- but the substance of the stated theory that is questionable. It seems to me that the theory and the definition in question fails to describe the cases which are provided by political or community action. It is misleading, for instance, and thus of little help, in distinguishing those activities that can be argued to be "best" achieved via community action, rather than by a process which relies on individual decisions and preferences. As an illustration, consider the case of television broadcasting which has been defined as pure public good involving the "vexing problems of collective expenditures,"¹ as much as does the case of "deterrence" or defense in general. The latter is perhaps the more impure, using Samuelson's definition. Yet, while both are said to have zero marginal costs, it may be argued that the former is "better" served when subject to ordinary pricing, and the latter "better" served when the institutional arrangement is that of collective expenditures.

I might note at the outset that lack of property rights (externalities) is the crucial element giving rise to these "vexing

¹Paul A. Samuelson, "Aspects of Public Expenditure Theories," Review of Economics and Statistics, XL (November, 1958), p. 335.

problems."¹ This is not to say, of course, that even were it possible to define and enforce such rights, once created the desired outcome is necessarily "best" achieved by a market system.² The efficiency with which property rights lead to an allocation of the scarce resources through a market system is neither independent of the particular problem, nor can that system be expected to be uniformly superior to other institutional arrangements. Therefore, one can, without logical contradiction, admit the absence of property rights on the one hand, and argue against reliance on them on the other. The property rights-market system is necessarily inferior if it yields (or if expected to yield) a less satisfactory outcome than the political process, regardless of how inefficient the political process might be. Finally, the notion of efficiency itself is normative and a function of the accepted definition of property rights themselves.³ However, we can trace the implications of various institutional arrangements, since each may reward a different set of incentives.

¹The discussion of "cheating" (refusal to reveal preferences) would have no meaning without the absence of property rights. If I have property rights in the defense I buy, why would you not reveal your preferences about the defense you would like to buy?

²See Ronald Coase, "The Problem of Social Cost," Journal of Law and Economics, V. 3 (October, 1960), pp. 1-44.

³I am indebted to Professor Armen A. Alchian for bringing this point to my attention.

II. TELEVISION BROADCASTING

"Here is a contemporary instance. The Federal Communications Commission is now trying to make up its mind about permitting subscription television. You might think that the case where a program comes over the air and is available for any set owner to tune in on is a perfect example of my public good. And in a way it is... But you would be wrong to think that... A descrambler enables us to convert a public good into a private good; and by permitting its use, we can sidestep the vexing problems of collective expenditure, instead relying on the free pricing mechanism.

"Such an argument would be wrong. Being able to limit a public good's consumption does not make it a true-blue private good. For what, after all, are the true marginal costs of having one extra family tune in on the program? They are literally zero. Why then prevent any family which would receive positive pleasure from tuning in on the program from doing so?

Upon reflection, you will realize that our well-known optimum principle that goods should be priced at their marginal costs would not be realized in the case of subscription broadcasting. Why not? In the deepest sense because this is, by its nature, not a case of constant returns to scale. It is a case of general decreasing costs..."¹

We find that broadcasting, emission of energy into space, has two interrelated characteristics which are: (a) the marginal cost of an extra family tuning in is zero, and (b) it is a decreasing cost industry, presumably because of (a), since the cost of a program is divided by a larger and larger denominator as more people tune in.²

¹Samuelson, op. cit., "Aspects of Public Expenditure Theories," p. 335. Italics provided.

²Strictly speaking, the power isoquants, delineating the geographical boundaries, and their shapes depend on the amount of scarce resources utilized. That is a larger area of coverage requires the employment of a greater amount of scarce resources, with no obvious

A detailed analysis of television broadcasting must remain for a later date, but here I shall indicate why the conclusions reached may not be justified on technical grounds.

To focus attention on the crucial elements of the argument, which as we shall see makes unfortunate the use of the notion of Pareto optimality, consider two implications of the analysis: (1) If the programs available were nothing but a constant beep-beep signal, the above analysis would insist that by making tuning in free, we achieve optimum allocation of resources. One certainly will argue, and justifiably so, that a program consisting of constant beep-beep signals will not be commercially sponsored, since the public would not tend to tune in. This raises the second consideration. (2) Why should we allow more than one channel to operate in an area? Clearly, the per unit cost of the program would be still smaller if everyone tuned in on the same channel. Is it not an economic waste to employ additional scarce resources which cost something in order to provide programs by the second, third, fourth... channel in the same area while the alternative, providing viewing by the first channel, costs nothing?

If the objection to subscription television is to rest on the technical consideration contained in the statement, I do not see how the literal use of the same analysis would not require one to object to wasting of the scarce resources by permitting more than one channel in an area. But, one may interpret the analysis generously, and note characteristics of decreasing or increasing returns to scale. However, this does not seem to be the nature of the argument as stated above.

that the nature of the programs and thus the value of the output that the scarce resources produce are not independent of the number of the channels operating in a city. Yet it is this consideration which at one and the same time points up the essential character of the problem and testifies to the error involved in the analysis cited above. What determines the nature of the program and thus the value of the output for which the scarce resources are employed? Taking the program content, quality, etc., as given, and proceeding to generate Pareto optimality, is analogous to putting the cart before the horse.

It is common knowledge, of course, among economists, that a good or service is not free because no price is charged explicitly; the scarce resources that it utilizes must be paid for somehow and by somebody. There is a price mechanism operating in the broadcasting industry; television time is allocated on the basis of advertising sponsorship. But, clearly the allocative effects of a price system depends on what is being priced and how.

In order to encourage people to provide the opportunity to advertise, a firm sponsors (bids for) programs which will be preferred by the group of people who are likely to be persuaded by the advertising (the message) and thus increase their purchases of that firm's product. In principle, the individuals who are not affected by the advertising will have no influence on the programs offered, given that firms have the perfect means of distinguishing the preference of those who are from those who are not likely to be affected by the advertising.¹

¹Do not those who are affected and so purchase the products pay something for the advertising expenses? In a sense entertainment is

The fundamental character of commercial broadcasting, both television and radio, is that the nature and thus the value of the programs (the cost of the scarce resources in alternative uses including the use of the rights of radiation, "frequencies," for other than broadcasting) is determined by the productivity of advertisement. To bring out the flavor of what is involved, consider the following cases. First, for a given outlay, the returns to advertising will be higher if a program is viewed by a larger rather than a smaller group of potential purchasers of the firm's product. Second, for a group of a given size, that program will be chosen which minimizes the cost of the production. However, the productivity of advertising per viewer is not uniform nor is it independent of the characteristics of potential individual viewers. But neither is the size of the group independent of the total costs incurred in broadcasting the messages (i.e., audiences are increased by changes in quality, format, promotional expenses, etc.).

Moreover, competition among advertisers will result in different programs being made available, each tailored to appeal to various subsections of the population, e.g., children, male and female adults. Thus, in order to compete with other advertisers, a firm will incur additional costs up to the point where it equals the marginal profits derived from advertising which is generated by an additional viewer. This not only modifies the principle of duplication,¹ but also mitigates

free for those who have the same preferences, but are not affected by the advertisements, but it is not free from society's point of view.

¹See Peter O. Steiner, "Program Patterns and Preferences, and the Workability of Competition in Radio Broadcasting," Quarterly Journal of Economics (May, 1952), pp. 194-223, where the size of the audience is not explicitly made to be a function of the costs of production.

against the validity of the proposition that "the true marginal costs of having one extra family tune in on the program... are literally zero" as far as the resource allocation in this restricted sense is concerned. The marginal viewer is very much part of the calculations leading to the kind of programs made available for viewing.

To be sure, there is a link between the productivity of advertising and the nature of the programs made available. Our discussion so far sheds some light on the nature of that relationship, albeit in a crude fashion. It is difficult to outline exact differences in the results obtained by commercial as opposed to subscription television. Let us, however, investigate the conditions under which these results, in terms of frequency of occurrences of different types of programs and the total use of the resources in broadcasting, will be identical for commercial and subscription television.

We shall assume that the allocation of resources in broadcasting depend on criterion of maximizing the present value of the expected returns, a criterion which has not been questioned by others, at least in dealing with the problem under consideration. Now in order that the two institutional arrangements result in identical resource allocation, it is necessary that both revenues and costs be independent of the system. This means that in each and every case, for given costs of production, the profits obtained from advertising be exactly equal to the revenues that could have been generated if the viewers were allowed to pay for the privilege of enjoying the program. In principle this requires that profitability of advertising be, in a sense, a function of elasticities exactly the same way as

total revenue is dependent on price elasticity of demand. I see no reason to believe that the elasticity of receptibility to the message broadcast, and thus the profitability of advertisement in all cases, is the same as the price elasticity of demand for a program in its entertainment capacity.

Consider two programs. The first, for a relatively low total cost of generation, would appeal to a relatively small number of viewers who would be willing to pay a relatively large amount to receive the program. The second, for a relatively large total cost of generation appeals to a relatively large number of viewers who would in total pay less than the first group. It is not at all difficult to imagine that the returns to advertising in the second example would be greater than the first and thus the program would be more likely to be produced. There is substance in the statement that minority tastes are not catered to in this market.

Finally, even if the resulting entertainment were the same under both systems, the total resources used in broadcasting will be affected if the profitability of broadcasting stations is changed. This might occur as a result of the difference in total revenues collected (from advertisers as against public via paid television) or because of the differences in the costs of production. Should the broadcasting industry become more profitable under pay television, more resources will be drawn into the industry assuming, of course, the rights of radiation, "frequencies," were marketable instead of being allocated by the license arrangements used at present.

One can expect that the nature and thus the value of the programs will be different when explicit prices are paid through subscription, as opposed to current practice in which value of the programs is essentially determined by the productivity of advertisements. To gain some perspective, note that currently the programs which are discarded may have on the order of 15-25 million viewers (the network programs do not become profitable before passing the 30 million mark with the accuracy of the current rating services). It is also instructive to note that many of the most popular programs cost only a few pennies per 1,000 families. Is it improbable that these 15-25 million viewers may not pay, say, 10 cents to view those disappearing programs? And, of course, this ignores those who do not even have the opportunity to make their preferences known.

If the value of the outputs are different and depend on the particular system, which implies that the economic costs of the scarce resources in alternative uses are different, then in what sense can we say that "free" television gives optimal allocation of resources and paid television does not?¹ If, as has been shown, one is forced

¹It has been stated recently that, "pay television may be judged preferable to having to listen to toothpaste advertisements every fifteen minutes, but if it involves charging anyone a positive price for doing something that does not cost anyone else a penny, i.e., for tuning in, it leads to inefficient allocation (though perhaps less so than does the advertising)." It is further said, footnote 21, "Again the proposition that price must be zero is not a dictum based on intuition but a theorem subject to formal proof. And again, it is subject to the qualification that it may in some instances be less inefficient to use the price system to raise the revenue required to cover the cost of a facility than to use taxes (even though this implies charging a positive price that will cause misallocation)... " F. M. Bator, The Question of Government Spending: Public Needs and Private Wants (New York, Harper & Brothers Publishers, 1960), p. 94. It does not seem that Bator is aware of the dependence of output on

to consider the output mix and its value in order to make the analysis relevant, then Professor Samuelson's conclusion cannot be considered optimal, employing as it does only the stated technical nature of the problem.¹

Basically the emptiness (irrelevance?) of the optimality rule used by Professor Samuelson stems from the fact that it uniformly identifies any and all situations as optimal without any discriminating power. Once the program is on the air, irrespective of its nature, kind, and thus the value of the services made available (the economic costs of the scarce resources in alternative uses), the resource allocation will be declared optimal if, and only if, tuning in is made free.

It must be emphasized that the problem with the use of marginal cost pricing in our case does not stem from the "marginal cost controversy." Although the general discussions may have some relevance to that controversy, there is a fundamental difference between the case of commercial broadcasting and those cases that have come to

the rules of the game, but is only disturbed by having to listen to the message advertised. What puzzles me is the statement that the conditions of optimal allocation, while subject to formal proof, may nevertheless produce results less efficient than that obtained by some other rule. What is better than optimum allocation of resources in a technical economic sense, a frame of reference which is repeatedly said throughout the book to characterize the nature of the argument? What kind of analysis (informal) is needed to ascertain the value of the formal proof?

¹One could not escape this by invoking some other alternative collective device, e.g., government subsidy of television broadcasting via taxes. The same problem will arise in the identification and valuation of the program menu, since voting process will incorporate similar problems, i.e., majority rule, etc.

be treated in there. The difference, of course, resides in the mechanism that generate the "output." In the cases cited in the controversy, the "outputs" are determined by a set of demand conditions summarizing the price-quantity relations which determine the value of the output as far as the individuals are concerned. But, there is no such direct mechanism operating in the case of commercial broadcasting; the competition among advertisers is at best a crude proxy!

Perhaps because of the length of the article, this fundamental distinction was not recognized in prescribing the general rule that:

"So long as increasing returns prevail in the actual range of consumption, we know that perfect competition will not be self-preserving and market behavior is unlikely to be optimal."¹

Clearly we have not changed the nature of the problem by restricting subscription broadcasting. For in commercial broadcasting the resource allocation is subject to competition among advertisers; and the per unit cost of any one of the programs currently on the air will decline if more people tuned in than they actually do. And yet commercial television has no obvious claim to generating optimum allocation of resources as we have seen.

It seems that a better world would be one with optimum income distribution to start with, whatever that may be, where the nature, size, and value of the output of broadcasting entertainment is determined by direct competition by community members armed with

¹Samuelson, op. cit., "Aspects of Public Expenditure Theories," p. 335.

their dollars. But once radiated, the reception of the entertainment is made "free." Unfortunately, given the constant evaluation which would be necessary, the desired information will not only be costly, but more important, of dubious value once the individuals in the community recognize the rules of the game. But, we must choose among alternatives, and it is irrelevant if none of them are called optimal within the Pareto logic.

Conceptually we may think of the nature, the size, and the value of the entertainment pie available for distribution on the one hand, and the system of the distribution itself on the other hand. If we are ultimately interested in value of the output generated by a given amount of scarce resources, then clearly a "free for all" (i.e., free tuning in) rule, which enables every set owner in the community to savor the pie, is of ambiguous merit when the size and the flavor of the pie also depends on the rule itself.¹

A correct approach would involve the analysis of the effects of different institutional arrangements, and discovering which arrangements tend to maximize the value of the scarce resources utilized in broadcasting and competing uses. This, of course, involves interpersonal comparison, but so does commercial broadcasting -- all those who are currently restricted from paying for and consuming the entertainment that they prefer, have the consolation that the marginal

¹ Analogously, in order to maximize the "consumer surplus" it is not sufficient to have a rule which sums the area under a given demand curve when the nature of the demand curve depends on the rule itself, e.g., even if the integration starts from a positive rather than zero price, it may yield a larger "consumer surplus" with a different demand curve.

cost of their tuning in some less or nonpreferred program is zero and does not cost anybody a penny.

In conclusion, therefore, broadcasting is a public good only insofar as it stimulates widespread public interest, including children and economists. It is only public good by definition, but not by virtue of analysis based on technical economic factors, if it is meant that broadcasting automatically calls forth the "vexing problem of collective expenditure." On technical grounds, I do not see any necessity for either a purely commercial ("free" reception), nor purely subscription television arrangement; after all, a co-existence policy is a distinct possibility. If the station "owners" had the "property rights" which did not restrict them to commercial transmission, broadcasting might, in fact, consist of both some subscription system and commercial sponsorship which may represent a "better" utilization of the scarce resources. The creation of additional value through "better" utilization of resources is the true costs which have been inflicted on the society by virtue of the restriction of pay television arrangement.